

# Constructive destruction: What has to be changed?

## *An essay on food security and sustainable intensification*

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*“We are at a critical juncture in human history, which could lead to widely contrasting futures. It is our contention that the future is not set in stone, but is malleable, the result of an interplay among megatrends, game-changers and, above all, human agency. Our effort is to encourage decision makers—whether in government or outside—to think and plan for the long term so that negative futures do not occur and positive ones have a better chance of unfolding.”*

National Intelligence Council (2012) Global Trends 2030: Alternative Worlds,  
[http://www.dni.gov/files/documents/GlobalTrends\\_2030.pdf](http://www.dni.gov/files/documents/GlobalTrends_2030.pdf)

When I was approached to deliver a speech for this conference on the Agriculture Days of the Future, the organizers asked me if I felt for a thoughts-provoking introduction starting from the concept of “creative destruction” that was coined by Schumpeter. Indeed, I found the following quote from Schumpeter quite relevant.

*“Capitalism, then, is by nature a form or method of economic change and not only never is but never can be stationary. [...] The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers, goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates. [...] ... the history of the productive apparatus of a typical farm, from the beginnings of the rationalization of crop rotation, plowing and fattening to the mechanized thing of today—linking up with elevators and railroads—is a history of revolutions [...] illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.”<sup>2</sup>*

This extract reveals the fundamental role that discontinuities play in the evolution of capitalism. The message is that discontinuities induce the destruction of the former economic structure and induce the creation of new ones. As, in parallel, foresight<sup>3</sup> focuses on discontinuities (also called ruptures)<sup>4,5,6</sup>, it makes sense to explore how the acts of looking forward could be related to a process of creative destruction.

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<sup>1</sup> The positions presented in the paper do not engage the GFAR and the GFAR Secretariat.

<sup>2</sup> Schumpeter, J. (1975, orig. pub. 1942),. *Capitalism, Socialism and Democracy*, New York: Harper. pp. 82-85

<sup>3</sup> Foresight is defined here according to the Merriam Webster and Collins dictionaries as “the act of looking forward” and “provision for or insight into future problems, needs, etc”. <http://www.merriam-webster.com/dictionary/foresight> and <http://www.collinsdictionary.com/dictionary/english/foresight>.

<sup>4</sup> Costanzo, L.A. and MacKay, R.B. (2008). *Handbook of Research on Strategy and Foresight*, Elgar Original Reference Series, Edward Elgar Publishing, Inc.

<sup>5</sup> van Asselt, M. (2012) *Foresight in Action: Developing Policy-Oriented Scenarios*, Earthscan risk in society series, Taylor & Francis

<sup>6</sup> van Notten P. (2004). A shocking experiment: alternative approaches for discontinuity-oriented scenario development, EU-US Seminar: New technology foresight, forecasting & assessment methods-Seville 13-14 may

The link between discontinuity, capitalism and foresight can perhaps best be summarized with this extract: “*The purpose of foresight is to take advantage of these competitive dynamics by reading ‘weak signals’ to anticipate discontinuities and either pre-empt them to defend the firm’s current competitive position or put a strategy in place to ensure that the firm can ride the discontinuity to a dominant market position...*”<sup>7</sup>. Indeed, firms are increasingly using foresight for strategic planning, to the point that it is now included in training courses offered by business management schools or Universities<sup>8</sup>. Likewise, books on foresight and strategic management have flourished. Foresight is thus considered as an instrument with potential to contribute to the evolution of capitalism through the anticipation of discontinuities. Does it mean that *creative destruction* can be anticipated and firms can adjust or shape the next evolutionary steps of capitalism through foresight?

In theory, yes. An abundant literature links the acts of looking forward to the anticipation and exploration of disruptions and discontinuities<sup>9</sup>. However, in practice the answer must be more cautious. Even in qualitative scenario-based forward looking approaches discontinuities are usually underestimated. Van Notten (2004:1) argues for example that ‘*In theory, scenario development is a way to consider future discontinuity. Scenarios are developed to identify discontinuity and thus help to prepare for “surprising” change.... However, there are indications that theory is not reflected in scenario.*’

Almost 10 years after, this situation has not very much changed and to some extent, in my view, discontinuities and ruptures are even becoming less central in the practice of foresight, at least as far as the futures of agriculture, rural development and farming systems are concerned. The point that I will develop thereafter is that the future of agriculture is at risk to be locked-in into a single pathway of marginal adjustments of a business-as-usual scenario, which, although rejected in the global discourses, will not induce the dramatic shift of paradigm the same discourses call for. This pathway is paved with food security warnings, sustainable intensification technologies and quantitative measurements. I will argue that alternative pathways do exist and should be seriously consider, for example concentrating on food insecurity and equity, intensified sustainability and qualitative changes in mindsets and institutions.

Unfortunately the process of destroying conventional ideas and creating new ones through challenging foresight approaches, which would help us to shape the future we want, is itself in a lock-in situation. This lock-in situation derives from a path dependency which is common to

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2004.

<http://foresight.jrc.ec.europa.eu/fta/papers/Session%206%20Importing%20Ideas/A%20shocking%20experiment.pdf>.

<sup>7</sup> Costanzo and McKay, 2008:192.

<sup>8</sup> See for example the Oxford Scenarios Programme offered by the Saïd Business School of the Oxford University. <http://www.sbs.ox.ac.uk/execed/strategy/scenarios/Pages/default.aspx>. Formal education (Master and Ph.D in foresight/future studies are also offered in Australia, Canada, Denmark, France, Germany, India, Mexico, Portugal, South Africa, Thailand, UK, USA...

<sup>9</sup> Burt G. (2007) Why are we surprised at surprises? Integrating disruption theory and system analysis with the scenario methodology to help identify disruptions and discontinuities, *Technological Forecasting & Social Change* 74 731–749

complex thinking<sup>10</sup> (here the complex thinking required for the practice of foresight). This path dependency results from the recurrent and repetitive use of certain forward looking practices which in turns tend to “lock-in” forward thinking in a narrow path of methods and ideas. One of the characteristics of this narrower path is the exclusion of discontinuities in the forward thinking process.

There is thus a paradoxical situation that needs to be explored. On one-hand foresight is being expected to unlock the lock-in of innovations systems<sup>11</sup>, to avoid priority-setting processes leading to reduce the options that could challenge conventional pathways, and to induce locks-out (Schoen et al 2011). Foresight is also expected to avoid that existing networks lock-out alternative views and options<sup>12,12</sup>. On the other hand, foresight may reinforce the path dependency and strengthen the existing lock-in<sup>11,13</sup> especially when it is used to identify the most probable vision of the future.

Indeed, foresight faces the risk of being trapped into “...[path-dependent] *processes – which may lead to ‘lock-ins’ to existing production and social systems – [which] are often characterized by the emergence of standards, dominant designs, and practices which reduce uncertainties of later actions while creating stable expectations concerning the behavior of others*” (Konnola, 2007:610).

I will further develop this with a focus on some issues that in my view currently reflect potential lock-in situations in foresight and deserve to undergo a process of constructive destruction if we want to build a different future for agriculture, for farmers and for rural areas. But before that I would like to better specify the posture I am taking for this purpose. Instead of using the exact Schumpeterian terminology of *creative destruction*, I will use the notion of “*constructive destruction*” introduced by Deeg (2009)<sup>14</sup> for the analysis of organisational discontinuities. This notion links together evolutionary and revolutionary processes in explaining discontinuity. In this process “... *the essence of all radical changes – as highlighted in the idea of creative destruction as well – is the underlying necessity of dissolving old assumptions, habits and practices before genuinely new (i.e. discontinuous) forms of organization can be implemented...* (Deeg 2009:12)

The underlying theory of change I am using here is linked to the thinking of the “*institutional economists in the Veblenian tradition*” (Hodgson, 2006:6). Within this posture, continuity results from recurrent two-way interactions between individual propensities and social structures through institutions as represented in the figure below.

The upper part of the figure displays how an ascending order is created from individual to structure and the lower part how a descending order is created from structure to individuals.

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<sup>10</sup> Wilkinson A. et al. (2013) Re|Source 2050. Flourishing from Prosperity: Faster and Further, Oxford UK: Smith School of Enterprise and Environment, U of Oxford. [http://www.smithschool.ox.ac.uk/wp-content/uploads/2012/12/ReSource-2050\\_Report.pdf](http://www.smithschool.ox.ac.uk/wp-content/uploads/2012/12/ReSource-2050_Report.pdf)

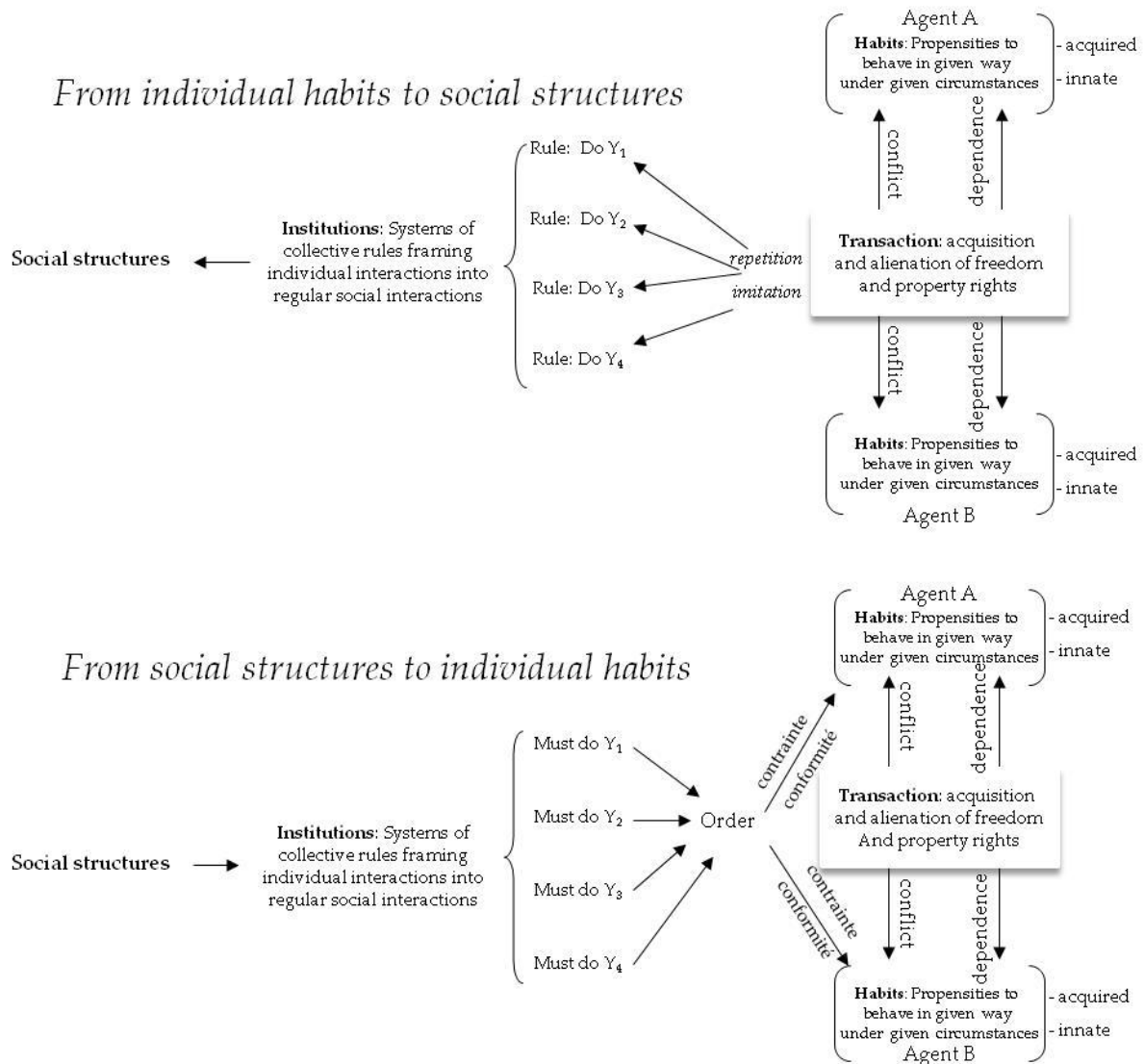
<sup>11</sup> B.J.C. Yuan et al. (2010). National technology foresight research: a literature review from 1984 to 2005, Int. J. Foresight and Innovation Policy, Vol. 6, Nos. 1/2/3.

<sup>12</sup> A. Schoen et al. (2011). Tailoring Foresight to field specificities *Futures* 43 232–242

<sup>13</sup> T. Könnölä et al. (2007). Diversity in foresight: Insights from the fostering of innovation ideas, *Technological Forecasting & Social Change* 74 608–626

<sup>14</sup> Deeg, Juergen, (2009), Organizational Discontinuity: Integrating Evolutionary and Revolutionary Change Theories, *The International Review of Management Studies*, 20, issue 2, p. 190-208,

Individuals interact exchanging rights and freedom in a transactional space through conflict and dependence. Repetition and imitation lead to the constitution of rules of behavior which finally become embedded in the society as institutions, which are crystallized in social structures. The lower part of the diagram shows in turn that the created and existing social structures constitute an institutional order which shape individual interactions through rules, to which individual conform shaping thus their individual habits. The two processes are continuously linked through loops of recursive causality.



Sources of radical changes leading to discontinuities are produced by a diversity of factors which may affect this complex system of interactions between individuals and social structures. Those factors can be either external or internal sources of variability and may affect directly either propensities or social structures.

I will emphasize here discontinuities introduced in the ascending causality process, starting from the transformation of habits. In this process, primary sources of change are the inter-individual variability due to different innate predispositions, and transformations in the contextual environment of the individuals which lead them to challenge the nature of the transactions and the prevailing rules. Everyone has more or less the possibility to accept,

reject or modify the terms of the transaction consisting in the alienation and acquisition of rights and freedoms. These predispositions may be expressed, in specific contexts, through different behaviors which introduce noise in the rules of the system. Certain forms of new behavior can be repeated and reproduced by the same agents and other agents. Repetition and imitation then induce the emergence of new rules. Changes in the external environment of the system leading to a situation where the current rules are no longer adequate can combine with this variability to favor the emergence of new rules. These external elements directly affect the transaction, the type of rights and freedom acquired and abandoned, and how the transaction will take place. Therefore, they change the nature of social relations embedded in the transaction, exacerbating or reducing tensions between conflict and dependence. This is particularly the case of changes in the natural environment (depletion of a resource, development of other resources, new physical constraints ...), the emergence of new agents, technical changes or changes in the number of agents (demographics).

What use can we make of this theory of change? My point is that in order for constructive destruction to happen through foresight, we need to identify critical junctures which will open spaces for an increasing number of individuals to develop new ideas and challenge the existing ones. At time of a critical juncture, a different or new thinking developed by some individuals may induce, through imitation and repetition, a move towards a new, different path, so that conventional thinking will no longer be used to deal with new questions.

Our time is a time of critical junctures. More, our expanding knowledge is opening wider spaces for critical junctures to happen. We progressively realize that all what we see, what we experience, is the product of complex interactions involving recursive causalities, contingent events, where the smaller parts change the whole and the whole affects the parts. It is up to us to take advantage of these critical junctures to act and contribute to the radical changes we think the current state of the world require to become a more hospitable place to leave for its population.

Coming back to the focus of this conference on the “Agriculture Days of the Future”, my intention here is to apply a constructive destruction process to a couple of hot issues in agriculture. These issues are respectively food security, sustainable intensification and quantophrenia.

### ***What could matter more than food security?***

There are several reasons why we should challenge putting food security at the top of the agenda of the international community.

First, forecasts made by various international organisation or advanced research organisation have successively released different predictions about the amount of food that the world will need in order to feed its population by 2050 and thus ensure food security. Predictions based on mathematical models have progressively varied downhill from 100% (as announced in one of the UN General Assembly meeting in 2008<sup>15</sup>, to 70%<sup>16</sup> and now 60%<sup>17</sup>. As a result

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<sup>15</sup> <http://www.un.org/News/Press/docs/2009/gaef3242.doc>

<sup>16</sup> <http://www.guardian.co.uk/environment/2011/nov/28/un-farmers-produce-food-population>

<sup>17</sup> (Fao, 2012).

research has been requested to provide answers to the question: can we produce 100% (then 70%, and now 60%) more in order to feed 9 billion people in 2050? This question is at the core of all food security discussions. The international community has even made of it a normative policy goal (Tomlinson, 2013) whereas it had never been intended to be so. Indeed the authors of this projection constantly and honestly said that they were trying to represent the most likely future, not the most desirable one (Bruinsma, 2003; Bruinsma 2006, Alexandratos and Bruinsma 2012). Yet, it became almost immediately the international norm. Other projections with different assumptions could have been developed by the authors, but they weren't. In the latest release Alexandratos and Bruinsma write: *"While at present the continuation of these trends does not seem likely, the high degree of uncertainty suggests the need to analyze alternative scenarios, which are not handled in this paper"*(2012:1). Thus only the trend projection (this is what was meant by most likely, also usually called "business as usual") was produced. The constant variation of numbers and the limitation to a single business as usual projection cast doubts both on the reliability of these statistics and their usefulness as elements of a normative policy goal.

Second, the food security question raised by this projection was obtained using a model which was operating with available macro-level quantitative data, fundamentally economic growth, population growth, yield growth and consumption trends. This has given to the food security question a global dimension, making it a global problem to which global solutions had to be found. Obviously the most likely and apparently appropriate global answer to an alleged global shortage of food would be to increase global food production, and by that it was meant global productivity. A recent WWF study bluntly states about the 70% and the 9 billion people to feed that: *"The impact of this message on the political and public debate about hunger and malnutrition was and remains impressive. Without further background information, this 70 % figure provides an excellent argument to all those who would seek to focus the hunger issue on the need to intensify agricultural production"*<sup>18</sup>.

Third, the ironical part of it is that while the need to increase production by 70% to feed 9 billion people in 2050 was making the international community claiming that "business as usual is not an option" (FAO), the normative future entailed in the projection the international community adopted was actually the one that assumed the pursuit of the trends – as if nothing had changed, indeed the business-as-usual option. As perfectly stated by Tomlinson (2011: 6) *"The statistics seem to have taken on a life of their own, reproduced without regard for the assumptions on which they were originally based"*.

Fourth, the macro-economic projection of food security did not (and was not designed nor intended to) say anything about how and by whom the computed production increases would be obtained. Yet, other works on the futures of the food system do exist. Many of them have produced more than a single "most likely" projection. From a scoping study by Erb et al (2009) on the futures of the food system, including different diets, different types of production systems and different land use intensities, we can find that our global food system

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<sup>18</sup> Grethe H., Dembélé A., and Duman N. (2011). How to feed the world's growing billions, understanding FAO world food projections and their implications, WWF, Heinrich Böll Stiftung.

can be re-thought and that this re-thinking would have to include changes in political, social and economic processes.

Why other, alternative exploration of the future of agriculture and food needs have not been able to re-shape our thinking on food security? The answer is probably because the current paradigm of food security has now become a myth in its pure sociological acceptance. It is a myth because it is a belief based on a unverifiable fact. Nobody can ascertain today that there will be actually 9 billion people in 2050; nobody can ascertain today that we need to increase production by 60%. Yet, this belief in an unverifiable fact is shaping the individual and collective behavior of the international and national research and development community, from scientists to donors, from national government to the international development community. It is a myth.

### **How can we de-mystify the current food security myth?**

According to the theory of change I have exposed earlier, this will require creating or taking advantage of an existing critical juncture where external factors could be used to trigger changes in habits of thinking about food security, which in turn would lead to a general shift in the way institutions and then social structures handle the food security question.

The critical juncture is already here; it is the revision of the MDG into post 2015 SDG. This revision offers the possibility to remind all some facts which in turn can lead to a different approach to food security. The first fact is that food security has been widely recognized as a distribution, an access problem not a global availability problem. What matters more than food security is food insecurity and its deeper roots poverty and inequity. Focusing on food insecurity helps reconsidering the true contribution of agriculture alone to improved access to food for those who, today and tomorrow, will not be in condition to acquire the quantity and quality of food they need to nourish themselves. The question is not how to feed the world future 9 billion, but how can we ensure that those who are currently food insecure will not be food insecure anymore and that other parts of the world's population and the new generations will not become food insecure?

This requires also a different focus of foresight, looking not anymore at the drivers of food security that is, food supply and food demand, but at the drivers of food insecurity that is, the forces which cause or could cause people to stay or become insecure in the future.

Unfortunately, turning the current foresight initiative from a focus on food security to a focus on food insecurity is not an easy task as most of the global foresight works are conducted within the same institutional settings and structures which believe in the food security myth. A possible option is to bring first the future of food insecurity into a foresight agenda at a more disaggregated local level and having it handled by national and local organization rather than by the international community and then build a more comprehensive (in the sense of global) picture through an ascending process.

With the latest revision at 60% increase of food production numbers themselves seem to indicate that food security is not anymore a production and productivity problem. A rapid calculation shows that in order to reach a 60% increase, say between 2010 and 2050, a yearly increase of production by 1.1% is enough. In the most recent version of the outlook 2050

Alexandratos and Bruinsma calculate that the expected trend in yield growth rate will lead to an increase of 60%: *“Based on our assessment of world agricultural resources, it seems that at the global level there should be no major constraints to increasing agricultural produce by the amounts required to satisfy the additional demand generated by population and income growth to 2050”*.

So what is the food security problem since globally there will be enough food for all without even having apparently to change the business-as-usual way of producing? The authors argue that this expected production growth will have to take place under more adverse conditions of land degradation and water scarcity. Furthermore food availability will not be homogeneously distributed all around the world and specific countries particularly in South Africa will be facing shortage of food.

The true challenges for research are thus to make this likely production growth rate much more sustainable than before, not much more intensive. It is a qualitative challenge not a quantitative challenge. It means that the usually de-coupled economic, environmental and social dimensions of sustainability must be brought together in the research and innovation agendas. And this is not just true for agricultural research issues. Actually the problem we don't properly deal with is that in the new inspirational concept of sustainable intensification the agrifood system is de-coupled from the global socio-economic system. Demography, urbanisation, income, poverty are regularly referred to as key drivers. We need to understand what and who controls the current state of these drivers and their future states to see if the orientation toward more sustainable food systems is consistent with them. For example we observe growing food insecurity in high income countries where food is more than plentiful.

We need to look beyond the immediate drivers, we need to explore rupture scenarios which can be developed through more qualitative exploratory foresight and then couple them with modeling to better measure their implications. We need new ways and concepts to demonstrate that the current and future constraints to production have been created by the current and past production system which we are using in order to calculate the future production growth rates. Indeed, current and future land degradation and water scarcities are inherited from the type of farming activities that have developed along the business-as-usual path of production intensification. We need to realize that intensive production systems are usually considered as more efficient and producing cheaper products because we never assessed them taking into consideration the cost of the negative externalities produced by intensive farming. If we included these costs, intensive farming would appear much less efficient in terms of resource use and much more expensive in terms of provision of food products.

What role for foresight? Food insecurity is widely recognized as a product of poverty and therefore of human agency. Declarations linking food (in)security and poverty abound. A recent synthesis of major foresight exercises confirmed that more than food availability, poverty and beyond it, inequity, was the main reason of food insecurity<sup>19</sup>. However, to my

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<sup>19</sup> Perspectives...



knowledge there is no foresight study of rural poverty<sup>20</sup>. Here again, though the conclusions of this collective analysis of foresight studies reached the international community, it was not able to challenge the myth. At least some foresight studies of food insecurity should be undertaken in order to provide answers to the questions raised by the WWF study: *Why are more than one billion people hungry in a world which has for decades produced enough food to feed every person on this planet? What are the main factors driving people into hunger and poverty? How do consumer behaviour and agricultural policy in industrialized countries affect hunger and rural poverty worldwide? Who is going to manage the use of natural resources in the future and what does a sustainable agriculture system look like in times of decreasing fossil resources?*<sup>21</sup>.

What could matter more than sustainable intensification?

The new challenge as stated above, stemming from this constructive destruction process of the food security myth is how to make the likely production growth rate much more sustainable than before? It is a sustainability challenge, not an intensification challenge. The answer the international community has provided to the food security challenge is sustainable intensification. Is that answer also applicable to the food insecurity, poverty and inequality questions? Is there another (or more) possible answer(s). I intend here to apply a similar constructive destruction process to sustainable intensification.

In the original work leading to the consensus that business as usual was not an option, the desirable option of sustainable intensification, was only mentioned once as follows: *"The rise in cropping intensities has been one of the factors responsible for increasing the risk of land degradation and threatening sustainability, when it is not accompanied by technological change to conserve the land, including adequate and balanced use of fertilizers to compensate for soil nutrient removal by crops. It is expected that this risk will continue to exist because in many cases the socio-economic conditions will not favour the promotion of the technological changes required to ensure the sustainable intensification of land use"* (Bruinsma 2003:134). At this time sustainable intensification was related to land use and to appropriate conservation technologies and fertility balances of productive land.

In a recent report Garnett and Godfray (2012) attempt to de-link the concept of sustainable intensification from the a specific production target and link it more strongly to productivity: *"The prime goal of sustainable intensification is to raise productivity (as distinct from increasing volume of production) while reducing environmental impacts"*<sup>22</sup>.

Yet, not all share this disconnect from total production in order to feed the world. Actually sustainable intensification is increasingly "operationalized" in global arenas as both a productivity and production concept, whose expression takes different form one of the most

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<sup>20</sup> with the exception of a Rockefeller pro-poor foresight guide which is more a visioning effort than a comprehensive exploration of future poverty through foresight

<sup>21</sup> Grethe, Dembélé and Duman, 2011:5

<sup>22</sup> Garnett T. and. Godfray C. (2012) Sustainable intensification in agriculture Navigating a course through competing food system priorities A report on a workshop <http://www.futureoffood.ox.ac.uk/sites/futureoffood.ox.ac.uk/files/SI%20report%20-%20final.pdf> accessed June14, 2013

recent being “*producing twice more with twice less*”<sup>23</sup> meaning that both absolute and relative dimensions are needed. Is that really a breakthrough, a drastic change of mindset, a new paradigm? I believe not. As an agricultural economist by training I have been taught that the contribution of economics to agronomy was optimization rather than maximization of production. Optimization was achieved through balancing incomes with production costs. And one way to reduce production costs is to produce the same quantity (or more) with less inputs. This is sound mainstream economics applied to agriculture and also valid for any kind of business. In all sectors of the economy, firms always include in their strategies to raise benefits the possibility to use less inputs for an equivalent level of output. There is nothing new here. It is therefore unlikely that agricultural research priorities and resulting technologies and innovations will shift from a path that can be well considered as inclusive of sustainable intensification, though its main results have been the degradation of the natural resources which are currently leading to the rejection of the business as usual scenario.

I would like to suggest here as a primary step of constructive destruction of the concept of sustainable intensification, to consider the implications of a reverted formulation of this concept as “intensified sustainability”. In this reversion, sustainability should be understood as a coalition of the three tenets of sustainable development: *economic development, social justice and environmental integrity*.

What can we achieved with such a concept? First, intensification is not anymore the key word, shifting thus the attention from quantity and production and productivity to sustainability and a more holistic understanding about what agriculture is about. Instead of seeing agriculture as the sector which provides food and the farmers the economic agents who produce the commodities needed for food production it helps consider many more functions of agriculture and also many other rationalities for the farmers than maximizing or optimizing yields. This concept would bring the idea of multi-functionality, the idea that objectives are not just to feed people, but to nourish people, creating healthy communities and economies and sustaining the planet, to paraphrase a quote from Herren in Tomlinson (2011:7). In addition, the use of the word “intensified” will put the attention on the need to do more about sustainability that what has been done so far, not more about productivity. In an attempt to clarify the distinction between the two concepts I propose the following table which needs further refinement but probably could be used as a starting point to create a critical juncture, taking the advantage of the Rio+20 outcomes and in particular its inclusion of agriculture.

Sustainable intensification	Intensified sustainability
Focus on intensification/productivity	Focus on resilience/sustainability
The sustainable dimension is linked to natural resources and environment	Sustainability includes the three economic, social and environmental dimensions
Incremental changes of the business as usual drivers	Rupture in the future states of the drivers, new drivers included
Global application/reach “prêt à porter”	Local application/specificity “sur mesure”

<sup>23</sup> Insert references : speech of the Dutch Ministry of Agriculture at the economist conference, find other

Scientific knowledge led	Local and scientific knowledge combined
Produce (twice) more with (twice) less	Produce differently
One trade off between environment and production	Multidimensional trade-offs between food security, equity, profit, and sustainability
Quantitative and easily measurable with short term impact	Multidimensional and multiple criteria to be considered with long term effects
Led by economists and agronomists	Led by societal values and local stakeholders
Focus on yields	Focus on resource recovery (human/employment, ecological/natural resources, economic/capital investment and income)

Before concluding this essay on constructive destruction I would like to raise a last point which I implicitly referred to in various part of this essay: the role numbers and quantities play in explaining why food security and sustainable intensification prevail at the top of the concerns about the future of agriculture. The growing belief that what we can only manage what we can measure is rooted in the evidence hard sciences such as physics needed to establish their theories. When Lord Kelvin was saying “To measure is to know” or “If you cannot measure it, you cannot improve it.” He was talking about the metrics needed in order to understand properties of physical substances and phenomena. Today the same stance is increasingly applied to all dimensions of human agency. Quantification is not the problem. As Prof Paquet says *“The problem arises when the use of such tools becomes the basis of a cult roughly captured by the motto that if it cannot be measured, it does not exist. Such a cult distorts the appreciation we have of socio-economic phenomena, and this mental prison acts as blinders that have toxic unintended consequences for public policies when they are shaped by an apparatus thus constrained”*.

As stated by Stevenson (2007:211)<sup>24</sup>, *“most authorities prefer forecasting and trend analysis to using futures tools such as emerging issues analysis and backcasting from a preferred vision”*. The reason for this preference is probably that forecasting and trend analysis are relying on, and producing, quantitative data, which in our societies fund the core of scientific evidence. I will come back later to this point as this growing obsession for numbers, or *quantophrenia* (Paquet 2009) has a strong impact on the options offered for the future of agriculture, rural development and farming.

Food security is reduced to the association of three numbers 60%, 9 billion, 2050 while the FAO definition of food security has much more qualitative dimensions (put the definition)

Sustainable intensification has become a double 2 figure: produce twice more with twice less.

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<sup>24</sup> T. Stevenson / Futures 39 (2007) 200–214.

## Conclusion:

The “*emergence of standards, dominant designs, and practices*” in foresight seems to have to be challenged today. As authors advocate for the preservation of technological diversity as a useful policy objective in order to avoid an early lock-in into a new technology Faber and Frenken (2009)<sup>25</sup>, similarly, I would like to advocate here for the preservation of a diversity of approaches and methods in foresight in order to avoid a lock-in into a specific type of foresight applied to a specific type of questions so that we can generate a diversity of new ideas and challenges.

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<sup>25</sup> Faber A. and Frenken K. (2009). Models in evolutionary economics and environmental policy: Towards an evolutionary environmental economics, *Technological Forecasting & Social Change* 76 : 462–470